AMENDMENTS TO THE CLAIMS

Please amend the claims as follows.

1. (canceled)

2. (canceled)

3. (currently amended) A joint device for an artificial leg, comprising:

an upper member;

a lower member spaced from said upper member;

an actuator connected between said upper member and said lower member, for accumulating energy generated by a weight of a user's body acting on the artificial leg, and operating by releasing the accumulated energy to actuate said lower member into joint motion; and

control means for controlling release of the accumulated energy to control operation of said actuator,

wherein said actuator has an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said control means opens and closes said switching valve to thereby control said actuator in respect of at least one of an operational speed and an operational timing ~~according to claim 1~~,

wherein said actuator comprises a plurality of actuators connected to different locations on said upper member and said lower member, and

wherein said control means controls said actuators such that said actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause the joint motion in a direction different from a direction in which the weight of the user's body acts.

4. (original) A joint device according to claim 3, wherein said upper member is an above-knee member, and said lower member is an under-knee member.

5. (original) A joint device according to claim 3, wherein said upper member is an under-knee member, and said lower member is a foot member.

6. (currently amended) A joint device for an artificial leg, comprising:

an upper member;

a lower member spaced from said upper member;

an actuator connected between said upper member and said lower member, for accumulating energy generated by a weight of a user's body acting on the artificial leg, and operating by releasing the accumulated energy to actuate said lower member into joint motion; and

control means for controlling release of the accumulated energy to control operation of said actuator,

wherein said actuator has an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said control means opens and closes said switching valve to thereby control said actuator in respect of at least one of an operational speed and an operational timing~~according to claim 1~~,

wherein said actuator comprises a plurality of actuators connected to different locations on said upper member and said lower member,

wherein said lower member is rotatably connected to said actuators, and

wherein said control means controls said actuators such that said actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause rotational motion including twisting motion, as the joint motion.

7. (original) A joint device according to claim 6, wherein said upper member is an above-knee member, and said lower member is an under-knee member.

8. (currently amended) A joint device according to ~~claim 1~~ claim 6, further comprising walking speed-detecting means for detecting a walking speed of the artificial leg, and

wherein said control means controls said actuator in respect of at least one of the operational speed and the operational timing according to the detected walking speed.

9. (original) A joint device according to claim 8, wherein said walking speed-detecting means includes a plurality of grounding sensors arranged on a sole of a foot of the artificial leg at respective locations different from each other, for detecting a grounded state of the foot, and determines the walking speed based on a difference in respective times of outputs from said grounding sensors.

10. (currently amended) A joint device according to ~~claim 1~~ claim 6, wherein said control means controls operation of said actuator based on a response-specifying control algorithm.

11. (currently amended) A joint device for an artificial leg, comprising:

an upper member;

a lower member spaced from said upper member;

an actuator connected between said upper member and said lower member, for accumulating energy generated by a weight of a user's body acting on the artificial leg, and operating by releasing the accumulated energy to actuate said lower member into joint motion; and

control means for controlling release of the accumulated energy to control operation of said actuator,

wherein said actuator has an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said control means opens and closes said switching valve to thereby control said actuator in respect of at least one of an operational speed and an operational timing~~according to claim 1~~, and

wherein said control means controls operation of said actuator based on a 2 degree-of-freedom proportional-integral-derivative (PID) control algorithm.

12. (currently amended) A joint device according to ~~claim 1~~ claim 11, further comprising a power source for enabling said control means to control operation of said actuator, and

walking state-detecting means for detecting whether or not the artificial leg is in a walking state, and

wherein when said walking state-detecting means detects that the artificial leg is not in the walking state, said control means causes said actuator to operate in a direction of reducing consumption of electric power from said power source.

13. (canceled)

14. (canceled)

15. (currently amended) A method of controlling a joint device for an artificial leg, the joint device including an upper member and a lower member spaced from each other, and an actuator connected between the upper member and the lower member,

the method comprising:

an accumulation step of causing the actuator to accumulate therein energy generated by a weight of a user's body acting on the artificial leg; and

a release step of causing the actuator to release the accumulated energy to thereby actuate the lower member into joint motion,

wherein said actuator includes an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said release step includes opening and closing said switching valve to control said actuator in respect of at least one of an operational speed and an operational timing~~according to claim 13~~,

wherein the actuator comprises a plurality of actuators connected to different locations on the upper member and the lower member, and

wherein said release step includes controlling the actuators such that the actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause the joint motion in a direction different from a direction in which the weight of the user's body acts.

16. (original) A method according to claim 15, wherein the upper member is an above-knee member, and the lower member is an under-knee member.

17. (original) A method according to claim 15, wherein the upper member is an under-knee member, and the lower member is a foot member.

18. (currently amended) A method of controlling a joint device for an artificial leg, the joint device including an upper member and a lower member spaced from each other, and an actuator connected between the upper member and the lower member,

the method comprising:

an accumulation step of causing the actuator to accumulate therein energy generated by a weight of a user's body acting on the artificial leg; and

a release step of causing the actuator to release the accumulated energy to thereby actuate the lower member into joint motion,

wherein said actuator includes an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said release step includes opening and closing said switching valve to control said actuator in respect of at least one of an operational speed and an operational timing~~according to claim 13~~,

wherein the actuator comprises a plurality of actuators connected to different locations on the upper member and the lower member,

wherein the lower member is rotatably connected to the actuators, and

wherein said release step includes controlling the actuators such that the actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause rotational motion including twisting motion, as the joint motion.

19. (original) A method according to claim 18, wherein the upper member is an above-knee member, and the lower member is an under-knee member.

20. (currently amended) A method according to ~~claim 13~~ claim 18, further comprising a walking speed-detecting step of detecting a walking speed of the artificial leg, and

wherein said release step includes controlling the actuator in respect of at least one of the operational speed and the operational timing according to the detected walking speed.

21. (original) A method according to claim 20, wherein the joint device includes a plurality of grounding sensors arranged on a sole of a foot of the artificial leg at respective locations different from each other, for detecting a grounded state of the foot, and

wherein said walking speed-detecting step includes determining the walking speed based on a difference in respective times of outputs from the grounding sensors.

22. (currently amended) A method according to ~~claim 13~~ claim 18, wherein said accumulation step and said release step are executed based on a response-specifying control algorithm.

23. (currently amended) A method of controlling a joint device for an artificial leg, the joint device including an upper member and a lower member spaced from each other, and an actuator connected between the upper member and the lower member,

the method comprising:

an accumulation step of causing the actuator to accumulate therein energy generated by a weight of a user's body acting on the artificial leg; and

a release step of causing the actuator to release the accumulated energy to thereby actuate the lower member into joint motion,

wherein said actuator includes an upper cylinder, a lower cylinder, a connecting pipe communicating with said upper and lower cylinders to form an oil passage filled with hydraulic

fluid for operation of said actuator, and a switching valve mounted on said connecting pipe for opening and closing said oil passage,

wherein said release step includes opening and closing said switching valve to control said actuator in respect of at least one of an operational speed and an operational timing~~according to claim 13~~, and

wherein said accumulation step and said release step are executed based on a 2 degree-of-freedom proportional-integral-derivative (PID) control algorithm.

24. (currently amended) A method according to ~~claim 13~~ claim 23, wherein the joint device further includes a power source for controlling operation of the actuator,

the method further comprising a walking state-detecting step of detecting whether or not the artificial leg is in a walking state, and a power-saving step of causing the actuator to operate in a direction of reducing consumption of electric power from the power source when it is detected in said walking state-detecting step that the artificial leg is not in the walking state.

25. (withdrawn) A control unit including a control program for causing a computer to control a joint device for an artificial leg, the joint device including an upper member and a lower member spaced from each other, and an actuator connected between the upper member and the lower member,

wherein the control program causes the computer to cause the actuator to accumulate therein energy generated by a weight of a user's body acting on the artificial leg, and cause the actuator to release the accumulated energy to thereby actuate the lower member into joint motion.

26. (withdrawn) A control unit according to claim 25, wherein when the control program causes the computer to cause the actuator to release the accumulated energy, the control program causes the computer to control the actuator in respect of at least one of an operational speed and an operational timing.

27. (withdrawn) A control unit according to claim 26, wherein the actuator comprises a plurality of actuators connected to different locations on the upper member and the lower member, and

wherein when the control program causes the computer to cause the actuator to release the accumulated energy, the control program causes the computer to control the actuators such that the actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause the joint motion in a direction different from a direction in which the weight of the user's body acts.

28. (withdrawn) A control unit according to claim 27, wherein the upper member is an above-knee member, and the lower member is an under-knee member.

29. (withdrawn) A control unit according to claim 27, wherein the upper member is an under-knee member, and the lower member is a foot member.

30. (withdrawn) A control unit according to claim 26, wherein the actuator comprises a plurality of actuators connected to different locations on the upper member and the lower member,

wherein the lower member is rotatably connected to the actuators, and

wherein when the control program causes the computer to cause the actuator to release the accumulated energy, the control program causes the computer to control the actuators such that the actuators operate differently in respect of at least one of the operational speed and the operational timing, so as to cause rotational motion including twisting motion, as the joint motion.

31. (withdrawn) A control unit according to claim 30, wherein the upper member is an above-knee member, and the lower member is an under-knee member.

32. (withdrawn) A control unit according to claim 26, wherein the control program causes the computer to detect a walking speed of the artificial leg, and

wherein when the control program causes the computer to cause the actuator to release the accumulated energy, the control program causes the computer to control the actuator in respect of at least one of the operational speed and the operational timing according to the detected walking speed.

33. (withdrawn) A control unit according to claim 32, wherein the joint device includes a plurality of grounding sensors arranged on a sole of a foot of the artificial leg at respective locations different from each other, for detecting a grounded state of the foot, and

wherein when the control program causes the computer to detect the walking speed of the artificial leg, the control program causes the computer to determine the walking speed based on a difference in respective times of outputs from the grounding sensors.

34. (withdrawn) A control unit according to claim 26, wherein the control program causes the computer to control the accumulation of energy and the release of the accumulated energy by the actuator, based on a response-specifying control algorithm.

35. (withdrawn) A control unit according to claim 26, wherein the control program causes the computer to control the accumulation of energy and the release of the accumulated energy by the actuator, based on a 2 degree-of-freedom PID control algorithm.

36. (withdrawn) A control unit according to claim 26, wherein the joint device further includes a power source for controlling operation of the actuator, and

wherein the control program causes the computer to detect whether or not the artificial leg is in a walking state, and cause the actuator to operate in a direction of reducing consumption of electric power from the power source when it is detected that the artificial leg is not in the walking state.